ORIGINAL ARTICLE

Cost-effectiveness analysis of a proposed public health legislative/educational strategy to reduce tap water scald injuries in children

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Objective: To determine the cost effectiveness of a public health legislative/educational strategy to reduce tap water scalds in children less than 10 years of age.
Design: Cost-effectiveness analysis conducted from the government perspective over a 10-year time horizon.
Population: Children under 10 years of age in Ontario, Canada
Interventions: Legislation to set thermostat settings on new domestic water heaters to lower temperatures (maximum 49°C) plus annual educational notices to utility customers versus status quo.
Main outcome measures: The burden of tap water scalds, healthcare resource utilization, the cost and effectiveness of the proposed intervention, and the probabilities assigned to health outcomes were modeled in a decision analysis based on population-based data, patient charts, and the published medical literature. All costs and health outcomes beyond 1 year were discounted at 3%.
Results: An estimated 182 children under 10 require medical care for tap water scald injuries annually in Ontario (13.98 per 100 000). Of these, 65 require emergency department (ED) care only (median cost $C149 per injury), 103 require ED care with clinic follow-up ($C577 per injury), 14 require hospital admission ($C5203 per injury), and two require surgical skin grafting ($C28 526 per injury). The estimated cost of the intervention was $C51 000 annually, with a projected 56% reduction in tap water scald injuries. Over 10 years, the intervention group would show total costs of $C1.17 million and 704 scalds, compared with $C1.65 million and 1599 scalds in the status quo group. Therefore, the intervention would be cost saving, with an incremental ratio of $C531 saved per scald averted. Sensitivity analyses showed that the intervention would remain cost saving through a wide range of variable estimates.
Conclusions: Legislation to lower thermostat settings on domestic water heaters plus annual educational notices to utility customers would generate cost savings while reducing the morbidity from tap water scalds in children.

Burn injuries are responsible for an average of 77 deaths and 1740 hospitalizations annually in children and youth (0–19 years) in Canada.[1] Of these, scald injuries account for 70% of burn-related hospitalizations and 45% of burn-related emergency department visits.[1] Of all scald injuries, 5–10% are tap water scalds.[1 2]

There is a logarithmic relationship between water temperature and scald severity. In an experimental study, a third degree (full thickness) burn occurred in 2–5 s at 60°C, in 10–30 s at 55°C, and in 5–10 min at 49°C.[3] Current regulations in Canada allow domestic water heaters to be factory-set at 60°C.

Numerous educational interventions have encouraged households to test and lower domestic water heater temperatures, with variable success.[4 5] In general, the combination of education and legislation is considered a more effective approach to prevention.[6] In the United States, Washington State passed legislation in 1983 that required new water heaters to be set at 49°C.[7] In addition, the legislation required that rental units had to have individual water heaters set at 49°C each time a new tenant occupied the unit. Warning labels had to be provided on heaters; annual notices warning of the hazards of hot water and the energy savings associated with lower water temperatures had to be provided to utility customers, and homeowners and tenants were allowed to turn up the heater thermostat if dissatisfied. Erdmann *et al*[7] showed that admissions for tap water scalds in children younger than 15 years in two hospitals in Washington State declined by 56% following legislation. Moreover, total body surface area burned, mortality, grafting, scarring, and length of hospital stay were also all reduced following legislation. A Canadian study also demonstrated that, when new hot water heaters were installed with the standard thermostat dial at the lower temperature, most households did not change their preset thermostats to higher temperatures.[8]

Priorities for injury prevention programming depend not only on program effectiveness, but also on cost effectiveness. Whereas studies have examined the cost effectiveness of other childhood injury prevention programs, such as bicycle helmet subsidy and child safety seat subsidy programs,[9] to our knowledge, no published studies have examined the cost effectiveness of tap water scald prevention programs.

The objective of this study was to assess the cost effectiveness of a proposed public health legislative/educational strategy to decrease tap water scald injuries in children, compared with the status quo.

METHODS

The study was approved by the Research Ethics Board of the Hospital for Sick Children.

Design

A cost-effectiveness analysis was conducted, with scald cases prevented as the outcome measure. The analysis was conducted

Abbreviations: ED, emergency department; HSC, Hospital for Sick Children; NACRS, National Ambulatory Care Reporting System

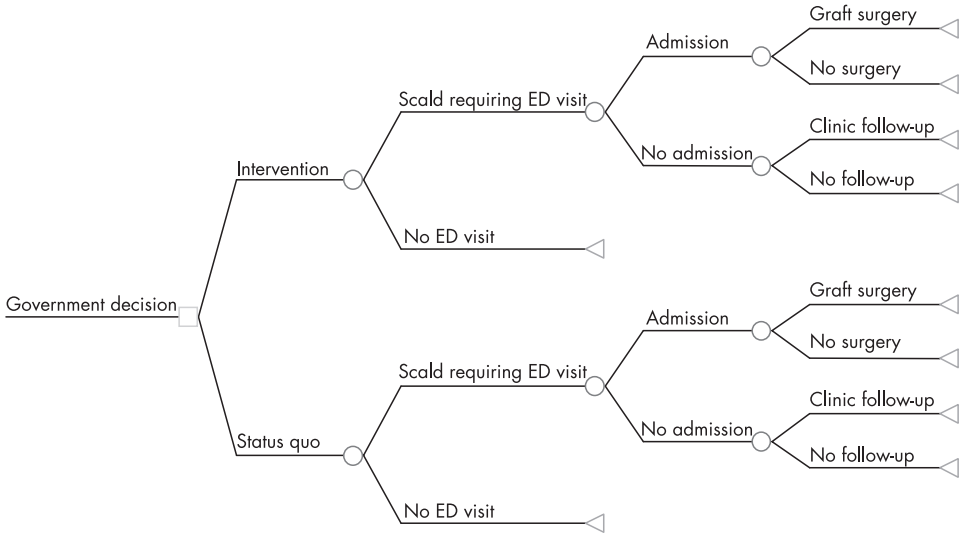

Figure 1 Decision model. ED, emergency department.

from the provincial government perspective, as direct healthcare costs and the legislation of safety codes fall under the jurisdiction of the provincial government in Canada. The target population was children under 10 years of age, as this group has the highest incidence of tap water scald injuries among children and youth.[1] A decision analysis model (fig 1) was used to compare the outcomes associated with the status quo and the intervention. Five possible outcomes (corresponding to increasing levels of scald severity and healthcare required) were modeled: (1) no medical attention sought—that is, no emergency department (ED) visit; (2) ED care without follow-up; (3) ED care with outpatient follow-up; (4) hospitalization without skin graft surgery; (5) hospitalization with surgical skin graft.

The probability assigned to each outcome was based on data from the National Ambulatory Care Reporting System (NACRS), from patient charts at the Hospital for Sick Children (HSC) and from the published medical literature.[7] A 10-year time horizon was chosen as the interval to reflect a realistic policy period for public health planning. This time horizon may cover the lifespan of more than one water heater, all with factory preset lowered thermostat settings. All costs and health outcomes beyond 1 year were discounted at 3%.

Data sources

Population-based data on the incidence of tap water scald injuries in children less than 10 years of age in Ontario were obtained through NACRS (www.cihi.ca). The purpose of NACRS is to collect demographic, clinical, financial, and administrative data on all ambulatory care visits in Ontario. Data submission is mandatory, and all hospital and community-based ambulatory care sites, such as day surgery, outpatient clinics, and EDs in Ontario, participate in the surveillance system.

Tap water scald injuries were identified using the International Classification of Diseases 10th revision (ICD-10CM) code X11. The Canadian Classification of Health Interventions coding system was used to identify surgical skin graft procedures (skin repair to any part of the body, codes with suffix LA-XX-A or B). Data from 1 April 2002 to 31 March 2003 were extracted. Census data were used to estimate the population of Ontario children under 10 years of age. Numerator and denominator data (NACRS and census data, respectively) were used to estimate the annual incidence of tap water scald injuries in this age group.

In addition, all children less than 10 years of age treated at the HSC—a tertiary pediatric academic health science centre in Toronto, Ontario, Canada—because of a tap water scald injury over the period 1995–2000 were identified. Three databases at HSC were reviewed: the Canadian Hospitals Injury Reporting and Prevention Program database, which contains records of all patients assessed for injuries in the ED at HSC; the HSC Burn Registry, which contains records of all inpatients treated in the burn unit at HSC; and the discharge diagnosis database.

The probability of discharge from the ED and the probability of need for follow-up were estimated from the chart review at HSC. The probability of admission to hospital, and the probability of subsequent surgical skin grafting were estimated from the NACRS dataset.

Healthcare resource utilization and costing

Healthcare resource utilization (inpatient and outpatient) was itemized on the basis of a detailed chart review of HSC patients. The direct medical cost for each patient was determined by assigning unit prices to each health resource item, derived from sources listed in table 1. The costs of outpatient physicians' services were based on provincial fee-for-service assessment fees. The per diem inpatient costs included personnel salaries and benefits, purchased services, medical and surgical supplies, medications, building and equipment costs, administration, and miscellaneous supplies. Hospitals in Canada are public non-profit institutions; therefore, inpatient case costs closely represent opportunity costs. Per diem inpatient costs were multiplied by the length of stay, and fees associated with physician inpatient services were added. As cost data were unavailable for ED visits and for Emergency Medical Services assessment and transportation, the charges for these services were used.

Indirect and out-of-pocket costs were not included. Because resource utilization was not normally distributed, the median cost for each health outcome was determined. All costs were expressed in 2002 Canadian dollars.

Intervention

The proposed intervention, modeled after the Washington State legislation, would consist of government regulation to set the factory preset thermostat to the lower temperature in new domestic water heaters, and public education through annual notices to utility customers encouraging home owners to lower their existing water heater temperatures.

The cost of the proposed intervention was derived through consultation with safety advocacy groups and industry experts. Setting the factory preset thermostat to the lower temperature

Table 1 Health Care Resource Unit Price Sources

Health Care Resource Item	Source of unit price
Emergency care	
EMS services	Ontario Ministry of Health
ED visit	Child Health Services, HSC
ED physician's fee	OHIP Schedule of Benefits, April 2002
Inpatient care	
Burn unit stay	Child Health Services, HSC
ICU stay	Child Health Services, HSC
Meals	Child Health Services, HSC
Linens	Child Health Services, HSC
Physicians fee	OHIP Schedule of Benefits, April 2002
Tests	
Blood tests	Lab Services, HSC
Microbiology	Lab Services, HSC
Urinalysis	Lab Services, HSC
Therapeutic drug monitoring	Lab Services, HSC
Electrocardiogram	OHIP Schedule of Benefits, April 2002
Chest X-ray	OHIP Schedule of Benefits, April 2002
Chest ultrasound	OHIP Schedule of Benefits, April 2002
Surgical care	
Surgeon fee	OHIP Schedule of Benefits, April 2002
Anaesthesia physician fee	OHIP Schedule of Benefits, April 2002
Operating room cost	Child Health Services, HSC
Post-anaesthetic care unit cost	Child Health Services, HSC
Outpatient care	
Burn clinic follow up visits	OHIP Schedule of Benefits, April 2002
Outpatient dressing changes	Child Health Services, HSC
Rehabilitation services	Child Health Services, HSC
Compression garments/splints	Wholesaler catalogues

ED, Emergency Department; EMS, Emergency Medical Services; HSC, Hospital for Sick Children; ICU, Intensive Care Unit; OHIP, Ontario Health Insurance Plan

of 49℃ in new domestic water heaters was considered to have no cost. The cost of printing and distributing annual notices to utility customers in Ontario was determined by consulting a utility company, and estimated at $C51 000 per year. The annual cost of the intervention was modeled over 10 years, and the net present value calculated using a discount rate of 3%.

A relative reduction of 56% as the estimated effectiveness of the policy intervention was proposed on the basis of the study by Erdmann *et al*,[7] who found a 56% reduction in admissions for tap water scald injuries in children following legislation in Washington state. This estimate was varied in a sensitivity analysis.

Cost-effectiveness analysis

A decision analysis model compared the costs and outcomes of the intervention against the status quo, and an incremental ratio of the difference in total costs from the difference in cases between the intervention and status quo groups was calculated.

Sensitivity analysis and threshold estimation

Sensitivity analysis was used to test the validity of the findings by varying the underlying assumptions. Key model parameters including the probability of health outcomes, the cost of medical care for each health outcome, the cost of the intervention, and the effectiveness of the intervention were varied by 30% using one-way sensitivity analysis. For each variable, the threshold value at which the intervention and status quo had equal total costs was then determined. The impact of a discount rate of 5% on costs and consequences was also examined, as recommended by guidelines.[10]

RESULTS

Base-case analysis

On the basis of NACRS data, 182 children under 10 years of age required ED services for tap water scald injuries in Ontario in the fiscal year 2002–2003. This gives a provincial annual incidence rate of 13.98 per 100 000 children. Of these 182 children, 168 (92%) were discharged from the ED, and 14 (8%) were admitted to hospital. Of those admitted to hospital, two (14%) required skin grafting.

At HSC, 35 children under 10 years of age were treated for tap water scald injuries from 1995 to 2000, inclusive. Table 2 lists the patient characteristics.

Of these 35 patients, 16 patients were transferred to HSC from other hospitals. Of the 19 patients for whom HSC was their base hospital, 13 (68%) were discharged from the ED and six (32%) were admitted to hospital. Of the 13 patients discharged from the ED, eight (62%) required burn clinic follow-up. There were 22 patients admitted to HSC, six from the ED and 16 transferred from other hospitals, of whom seven (32%) required skin grafting. Patients admitted from the ED and patients transferred to HSC from other hospitals had similar demographic data, severity of burn, length of stay, and cost of care. Therefore, cost valuations were based on the combined group of patients.

Table 3 lists parameter estimates for base-case analyses. The median length of stay for children who did not require surgery was 8 days, compared with a median of 35 days for children who required surgical skin grafting. Excluding the case of non-accidental injury did not alter the results, given that median costs were used.

Cost-effectiveness analysis

Over a 10-year time horizon with a 3% annual discount in costs, the status quo would result in total direct healthcare costs of $C1.65 million against 1599 cases of tap water scald injuries across the province. Assuming an estimated 56% reduction in tap water scalds, the intervention would result in total costs (intervention+direct healthcare costs) of $C1.17 million against 704 cases of tap water scald injuries. Therefore, the intervention would be less costly and more effective than the status quo, with an incremental ratio of $C531 saved per scald prevented.

Sensitivity analysis and threshold estimation

The probability of health outcomes, the cost of medical care for each health outcome, the cost of the intervention, and the effectiveness of the intervention were varied by $\pm$30% using one-way sensitivity analysis (fig 2). For example, the estimated effectiveness of the intervention ranged from 38% to 73% ($\pm$30% from base-case value). Although there was up to a 59% change in the incremental ratio, all analyses showed the intervention to be cost saving, with a reduction in the number of tap water scald injuries within a wide range of variable values. Threshold estimation (table 4) demonstrated that the intervention remained cost saving beyond the upper and lower quartiles of direct medical costs and to a lower limit of effectiveness of the intervention of 27%. At a 5% discount rate the incremental ratio of $C531 saved per scald prevented was unchanged.

DISCUSSION

Statement of principal findings

This study found that a proposed legislative intervention to set new domestic water heater thermostats to a lower temperature, plus annual educational notices to utility customers would be less costly and more effective than the status quo, with an incremental ratio of $C531 saved per tap water scald prevented. Sensitivity analyses showed that the intervention would remain cost saving throughout a range of variable estimates.

Table 2 Characteristics of the 35 patients treated for tap water scald injuries at the Hospital for Sick Children Patient 1995–2000

Characteristic	
Median Age (range)	1.8 years (3 months to 9 years)
Age distribution	
<1 year	8 (23%)
1–4 years	21 (60%)
5–9 years	6 (17%)
Sex	
Male	20 (57%)
Female	15 (43%)
Total % body surface area burned	
<5%	14 (40%)
5–9%	12 (34%)
10–14%	6 (17%)
>15%	3 (9%)
% body surface with full thickness burn	
0%	31 (89%)
1–5%	3 (9%)
5–9%	1 (3%)
>10%	0 (0%)
Body part injured	
Lower extremities only	21 (60%)
Upper extremities only	5 (14%)
Trunk only	3 (9%)
Multiple areas	5 (14%)
Not indicated	1 (3%)
Context	
Preexisting conditions	1 (3%)
Nonaccidental injury	1 (3%)

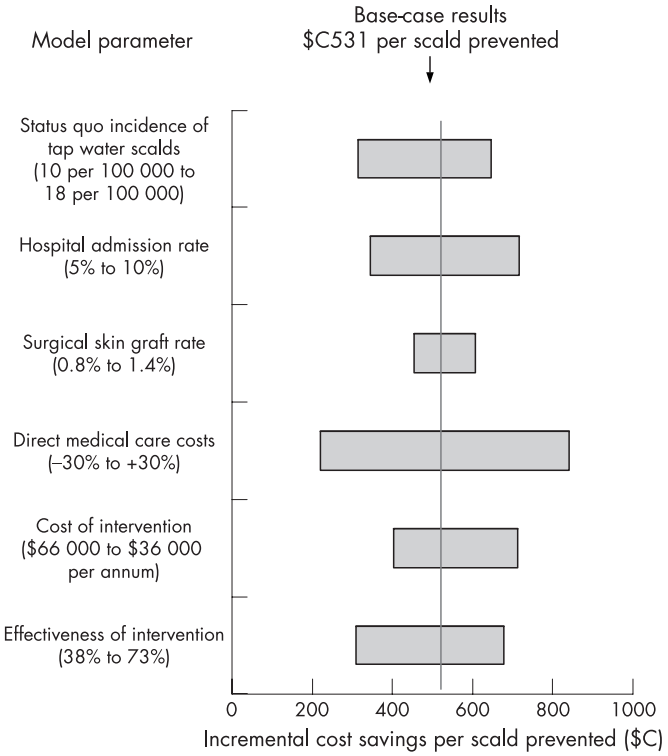

Figure 2 One-way sensitivity analysis incremental cost savings per scald prevented ($C).

Strengths and weaknesses of the study

Strengths of this study include the use of population-based data to estimate the annual incidence of ED visits, admission to hospital, and skin graft rate for tap water scalds in children under 10 years of age in Ontario. In addition, itemized healthcare resource use and direct medical costs were determined. Such an approach is more likely to reflect the true direct medical costs of care, compared with using hospital charges, which have been reported to overestimate costs.[11 12] Sensitivity analyses and threshold estimations were also performed to test a wide range of variable estimates. All showed that the principal finding was robust—that is, that the intervention remained cost saving.

A government payer healthcare system perspective was chosen, as this best reflects the perspective of the policy maker and has relevance for other large population-based single payer systems. From a broader societal perspective, however, childhood injury can lead to significant indirect and out-of-pocket costs for families—for example, work days lost in caring for the child.[13] There is also the potential for savings from decreased energy use after lowering temperatures of domestic water heaters. All these factors favor greater cost savings from a societal perspective, thus the incremental cost savings determined in our study are likely an underestimate.

There were a number of limitations. Although not ideal, the study of Erdmann *et al* is (to our knowledge) the only published

Table 3 Parameter estimates

Parameter	Base-case estimate	Source
Incidence		
Incidence of tap water scald injuries requiring medical care in children <10 years of age	13.98 per 100 000	NACRS 2002–2003
Health outcomes		
Proportion requiring ED care only	0.36	NACRS 2002–2003, HSC data
Proportion requiring ED care with outpatient follow up	0.56	NACRS 2002–2003, HSC data
Proportion requiring hospital admission without surgery	0.07	NACRS 2002–2003
Proportion requiring hospital admission with graft surgery	0.01	NACRS 2002–2003
Direct healthcare costs (median)		
Cost of ED care only	$149	HSC data
Cost of ED care with outpatient follow-up	$577	HSC data
Cost of hospital admission without surgery	$5203	HSC data
Cost of hospital admission with graft surgery	$28 526	HSC data
Cost of intervention		
Lower new domestic water heater temperatures	$0	Advocacy Groups
Annual educational notices to utility customers	$51 000	Utility Company
Effectiveness of intervention		
Reduction in incidence of tap water scald injuries %	56	Erdmann *et al*[7]

ED, emergency department; NACRS, National Ambulatory Care Reporting System; HSC, The Hospital for Sick Children. All costs in 2002 Canadian dollars.

Table 4 Threshold estimation

Variable	Threshold	Change from base-case value
Incidence of tap water scalds	6.8 per 100 000	51% reduction
Hospital admission rate	1.1%	86% reduction
Surgical skin graft rate	0%	Remains cost saving
Direct medical care costs		
Cost of ED care only	$72	52% reduction
Cost of ED care with outpatient follow-up	$275	
Cost of hospital admission without surgery	$2500	
Cost of hospital admission with graft surgery	$14 000	
Cost of intervention	$105 000 annually	206% increase
Effectiveness of intervention	27% reduction	52% reduction

ED, emergency department.

paper that has quantified the effectiveness of a legislative approach to the prevention of tap water scalds in children. The study examined the costs and consequences for households with new water heaters, not those with existing water heaters. Making changes to existing water heaters would entail additional costs, such as service calls; however, the number of tap water scalds prevented would also increase. Estimating the effectiveness of the intervention in rental units compared with residential homes was not possible in this study. The Erdmann study did not distinguish between scalds in rental and residential units. Given the social and demographic similarities, however, it is likely that the estimate of the effectiveness of the intervention in Washington State would be generalisable to Ontario, Canada.

The study included only costs to the public, government-sponsored healthcare system in Ontario. Therefore, although outpatient physician services were included, the costs of any prescription or non-prescription medications that might be prescribed on an outpatient basis were not included. In-patient expenses were also derived from a relatively small number of patients. We did not include inter-hospital transportation costs, given that they are highly dependent on geography, availability of burn services, and variation in capacity of community hospitals to provide burn care. Our estimation of hospital costs, however, included a fee of $240 for those patients who came to the ED by ambulance. An additional $240 charge to cover inter-hospital costs would represent <5% of the median hospital cost (without graft)—that is, well within the range of sensitivity analyses. Furthermore, addition of inter-hospital costs would demonstrate the intervention to be even more cost saving than estimated.

Quality of life and life years lost were also not measured. Whereas Feldman *et al*[2] found a 12.5% mortality in their study of tap water scald injuries several decades ago, more recently Walker[14] calculated a mortality of 0.06 per 100 000 annually in children with tap water scald injuries. From a quality of life perspective, however, scald injuries can have a considerable long-term impact on self-esteem[15] and other psychosocial sequelae.[16] The impact of lowering water heater temperatures on the incidence and severity of non-accidental injuries is also unknown; however, it could be argued that lower temperatures may reduce the severity of tap water scalds associated with such events. Different strategies may be required to reach this challenging population.

A major barrier to lowering temperatures of domestic water heaters has been concerns about *Legionella pneumophila*.[17] A water heater temperature >60°C is considered protective against *L pneumophila* growth; however, *L pneumophila* is ubiquitous in the environment. A prospective longitudinal study in Australia found a fourfold increase in the antibody titer of *L pneumophila* in 52% of children, indicating that they had been exposed to the bacterium, in the absence of clinical signs of *L pneumophila* pneumonia.[18] Furthermore, 28 states in the United States have passed legislation lowering temperatures of domestic water heaters, with no apparent increase in the incidence of *L pneumophila* pneumonia.[19] *L pneumophila* is not considered a major pathogen for children other than those who are immunocompromised. For those at high risk of *L pneumophila* pneumonia, the installation of a thermostatic mixing device is an alternative option.

Implications for prevention

There is a logarithmic relationship between water temperature and scald severity. A proposed legislative intervention to set new domestic water heater thermostat settings to lower temperatures plus annual educational notices to utility customers would generate cost savings while reducing the morbidity from tap water scalds in children. Extending this cost-effectiveness analysis to the societal perspective would determine the full societal impact of such an intervention. The findings may be applicable to other settings within Canada and internationally with comparable social or legislative frameworks. Areas of future study include other populations at risk, such as the elderly and disabled, incorporating service visits and thermostatic safety devices in the potential intervention, and factoring in the possible savings in energy use or costs for larger water heater tanks.

Key points

- This is the first study to examine the cost effectiveness of proposed legislation to set new domestic hot water heater thermostats to lower temperatures as a strategy to reduce the burden of tap water scalds in young children.
- The incidence of tap water scalds in the province of Ontario for children under 10 years was found to be 13.98 per 100 000 children per year.
- The median direct healthcare costs for the treatment of tap water scalds ranged from CDN$149 for ED care only to CDN$28 526 for hospital admission plus graft surgery.
- Legislation to lower water temperatures in new domestic water heaters and annual educational notices to utility customers would be cost saving if it reduced the incidence of tap water scald burns by at least 27%. With the 56% reduction achieved with a similar law in Washington state, CDN$531 would be saved per tap water scald averted compared with the status quo.

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REFERENCES

1 **Choiniere R**, Dorval D, Stanwick R. Fire-related injuries and burns. In:*For the safety of Canadian children and youth:from injury data to preventive measures*. Ottawa: Health Canada, 1997.
2 **Feldman K**, Schaller R, Feldman J, *et al*. Tap water scald burns in children. *Pediatrics* 1978;**62**:1–7.
3 **Moritz AR**, Henriques FC. Studies of thermal injury: the relative importance of time and surface temperature in the causation of cutaneous burns. *Am J Pathol* 1947;**23**:695–720.
4 **Katcher ML**, Landry GL, Shapiro MM. Liquid-crystal thermometer use in pediatric office counseling about tap water burn prevention. *Pediatrics* 1989;**83**:766–71.
5 **DiGuiseppi C**, Roberts IG. Individual-level injury prevention strategies in the clinical setting. *Future Child* 2000;**10**:53–82.
6 **Linares AZ**, Linares HA. Burn prevention: the need for a comprehensive approach. *Burns* 1990;**16**:281–5.
7 **Erdmann T**, Feldman K, Rivara F, *et al*. Tap water burn prevention: the effect of legislation. *Pediatrics* 1991;**88**:572–7.
8 **Webne SL**, Kaplan BJ. Preventing tap water scalds: do consumers change their preset thermostats? *Am J Public Health* 1993;**83**:1469–70.
9 **Miller TR**, Levy DT. Cost-outcome analysis in injury prevention and control: eighty-four recent estimates for the United States. *Med Care* 2000;**38**:562–82.
10 **Gold MR**, Siegel JE, Russell LB, Weinstein MC (eds). *Cost-effectiveness in health and medicine*. New York: Oxford University Press, 1996.
11 **William RM**. The costs of visits to emergency departments. *N Engl J Med* 1996;**334**:642–6.
12 **Harris BH**, Bass KD, O'Brien MD. Hospital reimbursement for pediatric trauma care. *J Pediatr Surgery* 1996;**31**:78–80.
13 **Osberg JS**, Kahn P, Rowe K, *et al*. Pediatric trauma: impact on work and family finances. *Pediatrics* 1996;**98**:890–7.
14 **Walker AR**. Fatal tapwater scald burns in the USA, 1979–86. *Burns* 1990;**16**:49–52.
15 **Abdullah A**, Blakeney P, Hunt R, *et al*. Visible scars and self-esteem in pediatric patients with burns. *J Burn Care Rehabil* 1994;**15**:164–8.
16 **Zeitlin RE**. Long-term psychosocial sequelae of paediatric burns. *Burns* 1997;**23**:467–72.
17 **Stanwick RS**. Balancing the risks: Legionella pneumophila pneumonia and tap water scalds in the home. *Can Med Assoc J* 1986;**135**:1251–2.
18 **Andersen RD**, Lauer BA, Fraser DW, *et al*. Infections with Legionella pneumophila in children. *J Infect Dis* 1981;**143**:386–90.
19 **NSW Health Department**. Hot water burns like fire: the NSW scalds prevention campaign phases one and two 1992–1994. Gladesville: NSW Health Department, 1999:19.

LACUNAE

Reed Elsevier to exit the defence exhibitions sector

Readers may recall an editorial comment about Reed Elsevier's support of arms shows (defence exhibitions). It was not just our editor who noted an apparent conflict between the purpose of scientific journals, especially medical journals, and this involvement of an important journal publisher. It appears the matter has now been resolved and we applaud Reed Elsevier for taking this decision.

Reed Elsevier announced on 1 June that it is to exit the defence exhibitions sector. This portfolio of five shows is part of Reed Elsevier's global business division and represents around 0.5% of group annual turnover. Sir Crispin Davis, Chief Executive Officer of Reed Elsevier, said: ''Our defence shows are quality businesses which have performed well in recent years. Nonetheless, it has become increasingly clear that growing numbers of important customers and authors have very real concerns about our involvement in the defence exhibitions business. We have listened closely to these concerns and this has led us to conclude that the defence shows are no longer compatible with Reed Elsevier's position as a leading publisher of scientific, medical, legal, and business content.''

Reed Elsevier intends to complete its withdrawal during the second half of 2007, subject to honoring its obligations to partners, customers, and other key stakeholders.